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Combination Staple Gun and Cap Feeding Device

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COMBINATION STAPLE GUN AND CAP FEEDING DEVICE

FIELD OF THE INVENTION

The present invention relates to staple guns and more particularly to a staple gun having a cap feeding device for automatically feeding one cap at a time to the staple gun such that when the staple gun is actuated or fired a staple is directed through the cap.

BACKGROUND OF THE INVENTION

It is known to use nail guns to attach roofing material such as tarpaper to the roof of a structure. It is also known to use small plastic caps to engage and hold tarpaper on the roof. Many such caps include nails prepositioned in the caps. A roofer will typically use a hammer and manually drive the prepositioned nail into the roof, securing the cap over the tarpaper in the process. This is a time consuming, laborious and expensive process. It is not easy for a roofer to stand on an inclined roof, and manually hold a supply of such caps and at the same time secure them into the roof structure.

It is known to provide cap feeding devices for employment with nail guns. These cap feeding devices automatically place a cap under the nail gun and thereafter the nail gun drives a nail downwardly through the cap into the underlying structure. However, there are many drawbacks to such conventional cap feeding devices. In many cases they are large, bulky, hard to handle, and in the end, are expensive. In many cases the combined nail gun and cap feeding device is so heavy that the weight alone makes it difficult for the average operator to handle and efficiently use.

One example of a conventional combination staple gun and cap feeding device is disclosed in U.S. Patent No. 6,302,310 and entitled "Staple and Nail Gun Assembly, Cap Fitting Device for Staple or Nail Gun, and Cap Assembly." This assembly includes a container for receiving the caps and the container is fixedly connected to a rear end of

the handle of the staple gun. A base is connected between the lower end of the container and the nose portion of the staple gun. The caps are filled in a passageway formed in the base and moved by a pneumatic device so that the caps are fed into a cap holding chamber located beneath the nose portion of the staple gun, one cap at a time. In this case, the position of the container makes the whole assembly bulky and difficult to handle.

There has been and continues to be a need for a simple, lightweight and easy to handle combination staple gun and cap feeding device.

SUMMARY OF THE INVENTION

The present invention entails a combination staple gun and cap feeding device that comprises an actuating mechanism or linkage that actuates the cap feeding device in response to the staple gun being actuated. In one embodiment, the device comprises a manual staple gun that is provided with an actuating mechanism or linkage for actuating the cap feeding in response to the staple gun being pressed against a surface which results in the staple gun shooting or directing a staple therefrom into the underlying surface.

In one particular embodiment of the present invention, the combination staple gun and cap feeding device comprises a staple gun for ejecting one staple at a time into a surface. A cap feeding device is attached to the staple gun for dispensing one cap at a time into the path of the staple being ejected from the staple gun. The cap feeding device includes a cap container for containing a stack of caps. A shuttle mechanism disposed adjacent the cap container includes a feeder for moving back and forth between a first and second position. A guide is provided and extends between the cap feeding device and the staple gun for directing caps from the cap feeding device to a position adjacent the staple gun such that staples being ejected from the staple gun are

directed through the caps, one at a time. A mechanical linkage or mechanism is connected between the staple gun and the cap feeding device for causing one cap at a time to be positioned in the path of respective staples being ejected by the staple gun. This mechanical linkage or mechanism is actuated or moved in response to the staple gun being actuated and is operative to actuate the shuttle mechanism and the feeder.

Further, the present invention entails a method of feeding caps from a cap feeding device to a staple gun wherein the cap feeding device is attached to or forms a part of the staple gun. The method includes engaging a surface with the staple gun and pressing the staple gun against the surface and causing one portion of the staple gun to move with respect to another portion. In response to one portion of the staple gun moving with respect to the other portion, the method entails driving a cap feeder associated with the cap feeding device by moving a linkage that is interconnected between the staple gun and the cap feeding device. In one particular embodiment, the cap feeding device is fixed with respect to one portion of the staple gun while the actuating linkage is connected to the other portion of the staple gun such that when there is relative movement between the two portions of the staple gun, the actuating linkage is effectively driven, causing the cap feeding device to dispense one cap at a time from the cap feeding device.

Other objects and advantages of the present invention will become apparent and obvious from a study of the following description and the accompanying drawings which are merely illustrative of such invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view showing the combination staple gun and cap feeding device of the present invention.

Figure 2 is a side elevational view of the combination staple gun and cap feeding device.

Figures 3-6 are a sequence of fragmentary sectional views of the combination staple gun and cap feeding device illustrating how the cap feeding device is actuated and driven in response to the staple gun directing a staple into an underlying surface.

Figures 7A-7D are schematic illustrations showing how a staple ejected from the staple gun is directed into engagement with a cap and how the engagement of the staple with the cap causes the cap to be dislodged from a guide or track that forms a part of the cap feeding device.

DESCRIPTION OF EXEMPLARY EMBODIMENT

With further reference to the drawings, the combination staple gun and cap feeding device of the present invention is shown therein and indicated generally by the numeral 10. Basically this device comprises two main assemblies, a staple gun and a cap feeding device indicated generally by the numeral 30. The staple gun portion of the device comprises a manually actuated staple gun that includes two movable portions, a main body indicated generally by the numeral 12 and a movable member indicated generally by the numeral 14. Details of the staple gun itself are not dealt with herein because such is not per se material to the present invention and further, manual staple guns and even automatic or semi-automatic staple guns are well know in the art. For example, note the disclosures found in U.S. Patent Nos. 6,302,310; 6,543,666; 6,598,776; and 5,328,075. The disclosures of these patents are expressly incorporated herein by reference.

In any event, reviewing the basic structure of the staple gun itself, the main body 12 includes an elongated handle 16. Although not shown, a staple holding magazine would be provided internally within the main body 12 and which would function to hold and supply staples to the staple gun. Extending from the handle 16 is a head 18. Movable member or striker 14 is disposed about the nose or lower front portion of the head 18. Movable member 14 includes a pair of side members 20 and a center member 22. As will be appreciated from subsequent portions of this disclosure, the side members 20 during a stapling operation typically engage an underlying surface S. Head 18 is pressed down towards the underlying surface S causing the movable member 14, including the side and center members 20 and 22, to move with respect to the head 18. Note that center member 22 during the course of the stapling operation moves upwardly, as viewed in Figure 1, into the housing that forms a part of the head 18. In conventional fashion, the upward movement of the movable member 14 initiates a stapling action. That is, the staple gun and particularly the main body 12 functions to engage and drive a staple ST downwardly between the side members 20. The area underneath the head 18 and in the vicinity of the side members 20 is referred to as a staple ejection area 24.

Mounted to the staple gun is a cap feeding device indicated generally by the numeral 30. As will be explained below, cap feeding device 30 functions to hold and dispense caps 28. That is, each time the staple gun is actuated to cause a staple ST to be driven from the staple gun into an underlying surface S, the cap feeding device will function to dispense and position a single cap 28 into the path of the staple ST such that as a staple moves downwardly from the staple gun the staple will engage and remove the cap from the cap feeding device and in the process the staple ST will be forced through the cap 28 causing the cap to be secured to the underlying surface S by the staple ST. See Figure 7D.

Viewing the cap feeding device 30 in more detail, the same comprises a cylindrical container 32 that includes a cylindrical wall structure and a top 34. As seen in Figures 3-6, container 32 includes a series of caps 28 stacked one over the other. Cap feeding device 30 also includes a spring 36 disposed on the top of the container and extending between the top 34 and the uppermost cap 28 in the stack. Effectively the spring 36 biases the stack of caps downwardly towards an open bottom formed in the container.

Extending between the open bottom of the container 32 and the staple ejection area 24 is a guide or track indicated generally by the numeral 50. Track 50 functions to guide or channel one cap 38 at a time from the bottom of the container 32 to the staple ejection area 24 where a staple can be shot or directed through the underlying cap 38. Various types of guides can be provided but in the embodiment illustrated herein, guide 50 comprises a track structure that includes a pair of C-shaped rails or tracks 50A and 50B. It is noted that the container 32 is disposed at an incline with respect to a horizontal line that runs parallel with the surface S as illustrated in Figures 3-6. Consequently, the guide or track 50 in this embodiment extends in a generally curved fashion from the open bottom of the container 32 to the staple ejection area 24. As will be appreciated from studying the drawings and the present disclosure, the segment of the guide or track 50 that extends between the container 32 and the staple ejection area 24 serves to hold and guide individual caps 38 towards the staple gun and the particular staple ejection area 24. However, as viewed in Figures 3-6, the track or guide 50 extends a short distance on the other side of container 32. This portion of the track acts to accommodate the cap feeder that will be described subsequently herein. Note in the drawings the relationship between the bottom portion of the container 32 and the guided track 50. Essentially the lower portion of the container 32 is aligned with the guide 50

such that the lower most cap of the stack contained within the container 32 is aligned with the C-shaped rails 50A and 50B during the cap dispensing operation.

For the most part, the guide or track 50 extending between the container 32 and the staple ejection area 24 comprises full C-shaped rails 50A and 50B. However, about the left most end portion of the guide 50, as viewed in Figures 3-6, the design of the guide 50 may be slightly altered to form a seat for the caps 38 that will permit the individual caps to be easily discharged from the track 50. Therefore, as viewed in Figure 7A-7D the guide or track 50 in the staple ejection area assumes a slightly different configuration. Here the lower portions of the C-shaped rail are shortened and tapered to form a tapered edge 50C. Further as illustrated here, the cap 38 also includes a tapered circumference. The combination of the tapered circumference of the cap 38 and the tapered edges 50C along with the flexibility of the cap allows the staple ST when driven downwardly into engagement with the cap to cause the same to flex and to be forced from the confines of the track or guide 50, again as illustrated in Figures 7A-7D.

In order to feed the caps 38 from the container 32 into the guide 50, there is provided a cap feeding mechanism indicated generally by the numeral 80. Cap feeder mechanism 80 comprises a cap feeder for engaging the lower most cap 38 in the container 32 and urging the cap from the container into the guide 50. The cap feeder includes a cap engager or plate 82. Note that the cap engager or plate 82 is confined within the track 50 and as illustrated in Figures 3 and 4 moves between a first and second position. In the first position, as shown in Figure 3, the cap engager 82 lies underneath the stack of caps 38 held within the container 32. In a second position, as illustrated in Figure 4, the cap engager or plate 82 is still confined within the track 50 but is spaced to the right of the bottom of container 32. Connected to the cap engager 82 and extending upwardly therefrom is an arm 84. Arm 84 is connected to a pivot connection 86 that is secured to the exterior of container 32. A spring 88 is secured

between the arm 84 and the sidewall of the container 32. Spring 82 biases the arm 84 towards the container and in the process biases the cap engager plate 82 towards the first position shown in Figure 3. It will follow that by moving the arm 84 back and forth that the cap engager 82 will be moved back and forth between the positions shown in Figures 3 and 4 and in the process will push one cap 38 at a time from the container 32 into the track 50 leading from the container 32 to the staple ejection area 24.

The cap feeding device 30 also includes or has associated therewith an actuating mechanism, indicated generally by the numeral 90, for driving the cap feeding mechanism 80. Actuating mechanism 90 includes a pair of links 92. Each link 92 is pivotally connected about its lower end to a side member 20 of the staple gun. The upper end of the links 92 are interconnected by a cross pin 94. As seen in Figures 3-6, cross pin 94 extends between the wall of the container 32 and the arm 84 of the cap feeding mechanism. To station and position the cross pin 94, there is provided a pair of connecting links 96 which extend from the upper end portions of the links 92 to a pair of supports 94 that project outwardly from the wall of the container 32. Thus, it is appreciated that as the links 92 are driven up and down as viewed in Figures 3-6, that the cross pin 94 will engage the arm 84 and cause the arm and its associated cap feeder or plate 82 to move.

The operation of the combination staple gun and cap feeding device 10 of the present invention is illustrated in Figures 3-6 and Figures 7A-7D. The following description will describe one cycle of operation. In this regard the staple gun is placed down into engagement with a surface S. Note in Figure 3 where the lower edges of the side members 20 engage the surface S. Thereafter the main body portion 12 of the staple gun is pressed downwardly towards the surface S. This results in relative movement between the head 18 of the staple gun and the side members 20. In particular, as the head 18 is pushed downwardly, the housing thereof tends to move

downwardly around the center member 22 extending upwardly from the side members 20. During this process, in conventional and known fashion, a staple is forced or shot from the staple gun into the underlying surface S. Because a cap 38 would be positioned generally between the side members 20 and in the seat of the track 50, the ejected staple ST would engage and dislodge the cap 38 from the track 50 and in the process would secure the cap to the underlying surface S as illustrated in Figure 7D.

As the main body 12 of the staple gun 10 is pushed downwardly to the position shown in Figure 4, this causes the connecting links 92 to be moved upwardly with respect to the cap feeding device 30. As the links 92 move upwardly, the cross pin 94 extending between the upper portion of the links 92 will engage the arm 84 of the cap feeding mechanism 80. This will cause the cap engager or plate 82 to be moved from the first position underlying the caps 38 (Figure 3) to the position shown in Figure 4. This will permit the stack of caps 38 to drop down to where the lower most cap is held within or aligned with the guide or track 50. Once the lower most cap falls down and is aligned with or positioned in the track 50, it is appreciated that the cap is then appropriately aligned to be pushed to the left as viewed in Figures 3 and 4, towards the staple ejection area 24.

As the main body 12 is moved upwardly from the surface S to where the lower edges of the side members 20 clear the surface S, conventional biasing action of the staple gun causes the side members 20 to move away from the main body 12 of the staple gun thereby causing the links 92 to be withdrawn or moved generally downwardly. Thus the cross pin 94 is moved away from the arm 84. This permits the biasing action of the spring 88 to move the cap engager of plate 82 from the position shown in Figure 4 to the position shown in Figure 5. As the cap engager plate 82 moves from right to left as viewed in Figures 4 and 5, it is seen that the same will engage the lower most cap 38 within the container 32 and drive the lower most cap from right to left through the guide

or track 50. As the main body 12 is further lifted from the surface S, the cap engager 82 is returned to its initial first position shown in Figures 3 and 6. Thus, in this cycle, a cap 38 has been discharged from the seat of the track 50 and another cap has been advanced down the track 50 to the seat area of the track, as illustrated in Figures 7A-7D where that cap is now appropriately aligned to be engaged and discharged by the next succeeding staple ST directed from the staple gun.

As described briefly above, the end portion of the guide 50 in the vicinity of the staple gun includes tapered edges 50C that in combination with the tapered circumference of the respective caps 38 permit the caps to be easily dislodged from the track 50 and secured to the surface S by the staple ST. Note in Figures 7A and 7B where the staple ST engages the cap 38 causing the same to be slightly deflected. As the staple ST is driven downwardly, as in Figure 7C, it is seen that the flexing of the cap 38 results in the same being dislodged from the seat area of the track 50. Finally, as shown in Figure 7D, the cap 38 is completely dislodged or discharged from the guide 50 and the staple ST has been directed downwardly through the cap into and through the underlying surface S.

The present invention may, of course, be carried out in other specific ways than those herein set forth without departing from the scope and the essential characteristics of the invention. The present embodiments are therefore to be construed in all aspects as illustrative and not restrictive and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.